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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is also included. (AG)

ED 063402

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TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

BRAIDING-MACHINE OPERATOR (cot. small wares; textiles) 6-19.986

B-489 S-216

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GATB # 2354

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

Braiding-Machine Operator (cot. small wares; textiles) 6-19.986

B-489

Summary

The General Aptitude Test Battery, B-1002A, was administered to a final sample of 51 workers employed as Braiding Machine Operators 6-19.986 at three plants in Georgia (West Georgia Mills in Whitesburg; Puritan Cordage Mills in Athens and in Madison). The criterion consisted of supervisory ratings. On the basis of mean scores, standard deviations, correlations with the criterion, job analysis data, and their combined selective efficiency, aptitudes K-Motor Coordination, F-Finger Dexterity, and M-Manual Dexterity were selected for inclusion in the final test norms.

GATB Norms for Braiding-Machine Operator 6-19.986 B-489

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
T	CB-1- G CB-1- K	65	K	Part 8	70
F	CB-1- O CB-1- P	80	F	Part11 Part12	75
M	CB-1- M CB-1- N	80	M	Part 9 Part10	80

Effectiveness of Norms

The data in Table IV indicate that 12 of the 17 poor workers, or 71 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 71 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 25 of the 30 workers who made qualifying test scores, or 83 percent, were good workers.

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TECHNICAL REPORT

I. Purpose

This study was conducted to determine the best combination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the occupation of Braiding-Machine Operator 6-19.986.

II. Sample

The General Aptitude Test Battery, B-1002A, was administered to a final sample of 51 workers employed full-time as Braiding-Machine Operators in three plants in Georgia; West Georgia Mills in Whitesburg (administered on June 10 and 24, 1960), Puritan Cordage Mills in Athens (administered on September 21 and 30, 1960), and Puritan Cordage Mills in Madison (administered on October 5,7 and 21, 1960). A total of 60 workers are employed at the three plants as Braiding-Machine Operators, and 57 volunteered to take the test; three workers had to be eliminated at the start due to a lack of the minimum level of education and three workers could not take the test because of illness. Eight weeks is considered the minimum training period for this job. All of the workers in the sample are considered as experienced.

TABLE I

Means (M), Standard Deviations (σ), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education, and Experience

N = 51	M	σ	Range	r
Age (years)	39.7	11.1	19-61	.248
Education (years)	8.5	2.0	6-14	.071
Experience (months)	93.9	112.6	6-468	.371**

** Significant at the .01 level

There are no significant correlations between age or education and the criterion. The correlation between experience and the criterion is significant at the .01 level. The correlation may indicate either that the raters had a bias in favor of those workers with more experience or that there was a tendency for those workers with more experito perform better on the job. The data in Table I indicate that this sample is suitable for test development purposes.

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III. Job Description

Job Title: Braiding-Machine Operator (cot. small wares; textiles) 6-19.986

Job Summary: Converts various natural and synthetic fibers into cordage of numerous specified dimensions, using several sizes of braiding machines that either braid the outside sheathing around a number of core threads or braid the material into a cord with a hollow center.

Work Performed: Maintains supply of sheath and core yarns by walking 50 feet to 100 feet to winder machine or storage area and selecting the type of yarn called for on job tickets. Stocks tubes, spools, bobbins and/or cones of yarn, weighing from 4 ounces to 16 pounds each, on arm and returns to allotted battery of braider machines, storing this material in yarn trough in front of machine or in boxes on floor near machine.

Prepares machine for further operation, (when stopped automatically due to lack of yarn) by advancing the machine through the rest of the cycle, rotating a hand lever about five feet from floor until empty carrier is in a position to be refilled. Cuts trailing yarn from tube several inches from braiding point with scissors and pulls close-fitting empty tube from spindle of carrier by tugging upward with one or both hands. Selects new tube of yarn from waist high yarn trough in front of machines, ravels off several rounds of thread and jams full tube down on empty spindle to insure tight fit. Threads leading end of yarn from new tube through three small guides and weaves it over and under the other threads of the braid opposite the direction of the travel of the particular carrier for about one complete braiding turn. Holds end of thread with left hand and starts machine with right hand by pushing lever, holding end until yarn is securely braided into sheath. Pulls loose end of new thread through braiding eye and snips off neatly with scissors as close to the cordage as possible to complete an almost invisible splice. (Works with 15 to 75 machines, depending on their complexity.)

Replenishes core yarn as needed by pulling empty cones, bobbins, spools and/or tubes from waist-high to floor level creel beneath machines and replaces it with filled tube or bobbin of material as called for on job ticket. Attaches leading end of yarn from new tube to trailing end of yarn from old tube with weaver's knot or square knot or runs leading end up into other core threads near braiding eye and attaches by twisting and pinching with thumb and forefinger until caught and held by other core threads.

Patrols aisles, when not busy with specific tests, doing minor housekeeping and flagging machines for faulty workmanship and flagging machines in need of repairs by attaching an empty tube in a designated spot to let machine fixer know that corrective action must be taken. Collects empty tubes in pockets of apron and deposits these empties in various containers strategically located in the work area, stripping off any scraps of yarn remaining by clipping with scissors or pulling off with hand. Deposits scraps of yarn in other containers designated for each type of yarn.

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IV. Experimental Battery

All the tests of the GATB, B-1002A, were administered to the sample group.

V. Criterion

Data for three criteria were collected; rank-order ratings, broad category ratings, and scores on USES Form SP-21, "Descriptive Rating Scale." Ratings and reratings on each criterion were made by the first-line supervisors in each of the three plants cooperating in the study. The ratings at West Georgia Mills were made on July 13 and August 11, 1960; and the ratings at Puritan Cordage Mills (Madison and Athens) were made on November 1 and 30, 1960. In obtaining the final criterion for the study, only the rank-order ratings and the descriptive rating scale scores were used. The relationship between the average linear scores for the rank-order ratings criterion (reliability coefficient of .95 obtained for this criterion) and the average descriptive rating scale scores (reliability coefficient of .93 obtained for this criterion) was found to be .90. Therefore, these two criteria were combined to obtain the final criterion for the study. The range of final criterion scores (average of the linear scores corresponding to the final rank-order ratings criterion and final descriptive rating scale criterion) was 12 to 94 with a mean of 50.0 and a standard deviation of 18.0.

VI. Qualitative and Quantitative Analyses

A. Qualitative Analysis:

The job analysis indicated that the following aptitudes measured by the GATB appear to be important for this occupation.

Motor Coordination (K) - required to coordinate eyes, hands and fingers in rapidly making up splices, in feeding thread into position, and in replacing spools.

Finger Dexterity (F) - required to easily and swiftly feed small strands of material into guides and braiding eye.

Manual Dexterity (M) - required to remove, place and position full and empty tubes of yarn on the carriers, and in creel, in an almost single motion.

On the basis of the job analysis data, Aptitudes V (Verbal Aptitude) and N (Numerical Aptitude) were considered as "irrelevant" for successful performance of the job.

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B. Quantitative Analysis:

TABLE II

Means (M), Standard Deviations (σ), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB; N = 51

Aptitudes	M	σ	r
G-Intelligence	76.8	16.1	.248
V-Verbal Aptitude	80.3	13.1	.237
N-Numerical Aptitude	73.5	20.0	.284*
S-Spatial Aptitude	80.6	17.2	.112
P-Form Perception	74.8	21.9	.223
Q-Clerical Perception	86.3	15.7	.267
K-Motor Coordination	82.2	20.4	.487**
F-Finger Dexterity	90.6	21.6	.389**
M-Manual Dexterity	100.7	21.5	.374**

**Significant at the .01 level
*Significant at the .05 level

C. Selection of Test Norms:

TABLE III

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important							X	X	X
Irrelevant		X	X						
Relatively High Mean						X		X	X
Relatively Low Sigma		X							
Significant Correlation with Criterion			X				X	X	X
Aptitudes to be Considered for Trial Norms							K	F	M

Trial norms consisting of various combinations of Aptitudes K, F, and M with appropriate cutting scores were evaluated against the criterion by the tetrachoric correlation technique. A comparison of the results showed that B-1002 norms consisting of K-70, F-75 and M-80 had the best selective efficiency.

VII. Validity of Norms (Concurrent)

The validity of the norms was determined by the tetrachoric correlation between the test norms and the criterion and applying the Chi Square test. The criterion was dichotomized by placing 33 percent of the sample in the low criterion group because this percent was considered to be the unsatisfactory or marginal workers.

Table IV shows the relationship between test norms consisting of Aptitudes K, F, and M with critical scores of 70, 75, and 80, respectively, and the dichotomized criterion for Braiding-Machine Operator 6-19.986. Workers in the high criterion group have been designated as "good workers" and those in the low criterion group as "poor workers."

TABLE IV

Validity of Test Norms for Braiding-Machine Operator 6-19.986
(K-70, F-75, M-80)

N = 51	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	9	25	34
Poor Workers	12	5	17
Total	21	30	51

$r_{tet} = .64$ $\quad \chi^2 = 7.377$
$\sigma r_{tet} = .23$ $\quad P/2 < .005$

The data in the above table indicate a significant relationship between the test norms and the criterion for the sample.

VIII. Conclusions

On the basis of the results of this study, Aptitudes K, F and M with minimum scores of 70, 75 and 80, respectively, have been established as B-1002 norms for Braiding-Machine Operator 6-19.986. The equivalent B-1001 norms consist of T-65, F-80 and M-80.

IX. Determination of Occupational Aptitude Pattern

The specific norms established for this study did not meet the requirements for allocation to any of the existing 35 occupational aptitude patterns. (revised 10/61). The data for this sample will be considered for future groupings of occupations in the development of new occupational aptitude patterns.